

ABSTRACT OF THE DISCLOSURE

A catalyst degradation determining method is for use with an emission control apparatus of an internal combustion engine that includes a catalyst disposed in an exhaust passage of the internal combustion engine, and a downstream of catalyst air-fuel ratio sensor disposed in the exhaust passage downstream of the catalyst. The method includes the steps of: ~~acquiring an oxidizing-reducing capability index value that changes in accordance with a degree of an oxidizing-reducing capability of the catalyst;~~ controlling an upstream-of-catalyst air-fuel ratio occurring upstream of the a first catalyst to an air-fuel ratio that is lean rich of a stoichiometric air-fuel ratio so that the catalyst stores first and second catalysts store oxygen in the catalyst up to a maximum storage amount of oxygen. The method then includes the steps of controlling the upstream-of-catalyst air-fuel ratio to a rich first lean air-fuel ratio that is rich of the stoichiometric until an output of a downstream-of-first-catalyst sensor indicates a lean air-fuel ratio, and then to a second lean air-fuel ratio and that has a value that is determined in accordance with the an oxidizing-reducing capability index value, until a time point when an output of the a downstream-of-second-catalyst air-fuel ratio sensor indicates an air-fuel ratio that is rich of the stoichiometric air-fuel ratio lean; ~~estimating a maximum oxygen storage amount of the catalyst by taking into account the value of the rich air-fuel ratio to which the upstream-of-catalyst air-fuel ratio was controlled;~~ and determining whether the catalyst has degraded based on the estimated maximum oxygen storage amount of the catalyst.